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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,074	11/26/2003	H. Juergen Kreuzer	48734-A	7832

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EXAMINER	
BOUTSIKARIS, LEONIDAS	
ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 08/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/721,074	KREUZER ET AL.	
	Examiner	Art Unit	
	Leo Boutsikaris	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 November 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/17/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Each of claims 1-3 refers to recording digital in-line holograms, as part of step a). It is not clear as whether these holograms are holograms of one object taken in different time instances, or whether they are holograms of the sample volume taken in different time instances. Similarly, claim 4 refers to recording a digital in-line hologram, thus representing the same problem. For examination purposes, it will be assumed that successive holograms of the sample volume are taken.

In addition, step b) in each of claims 1-3, is confusing since it is not clear whether the hologram that is subtracted from each of the holograms in the sequence of holograms is a member of the originally recorded sequence of holograms or it is some other hologram, e.g., a reference hologram. For examination purposes, the former will be assumed.

Finally, the phrase "reconstructing image(s) of the object at a (plurality of) depths into the sample in step d) in each of claims 1-3 is confusing since it does not make it clear that it

refers to numerical reconstruction, by selecting appropriate values for the Kirchhoff-Helmholtz mathematical transform.

Regarding claim 4, the relation between the digital in-line hologram recorded as a first series of pixels and a subsequent time-spaced sequence of digital in-line holograms is not clear. Furthermore, step c) does not state what holograms are used for reconstructing images of the object at a plurality of depths. For examination purposes it will be assumed that each hologram resulting from appropriate subtraction or addition of corresponding pixels is used. Furthermore, whereas the preamble of claim 4 refers to a method for tracking the trajectory of a plurality of objects in a sample volume, step c) refers to trajectory of a single object.

Claim 5 inherits the deficiencies of claims 1-4 from which it depends.

Allowable Subject Matter

Claims 1-4 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

Claim 5 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claims 1-5 are allowable over the prior art for at least the reason that even though the prior art discloses a method of recording a sequence of digital in-line holograms of a sample volume in order to measure the position of particles contained in a, for example, fluid medium, the prior art fails to teach or reasonably suggest, regarding claim 1, a method for tracking the trajectory in three dimensions of an object in a sample volume, comprising the steps of

subtracting from a first hologram as second hologram in each successive pair of the sequence of N holograms to generate N/2 difference holograms and summing the N/2 difference holograms to generate a summed hologram, regarding claim 2, a method for tracking the trajectory in three dimensions of an object in a sample volume, comprising the steps of subtracting a first hologram from each of the remaining holograms of the sequence of N holograms to generate N-1 difference holograms and summing the N-1 difference holograms to generate a summed hologram, regarding claim 3, a method for tracking the trajectory in three dimensions of an object in a sample volume, comprising the steps of subtracting a first hologram from each of the remaining holograms of the sequence of N holograms to generate N-1 difference holograms, and regarding claim 4, a method for tracking the trajectory in three dimensions of an object in a sample volume, comprising the steps of recording a digital in-line hologram and recording each hologram in a subsequent time-spaced sequence of digital in-line holograms, by subtracting or adding each pixel of said each hologram from a corresponding pixel of the said digital in-line hologram, as set forth by the claimed combination.

Dubois (US 6,535,276) discloses a method of measuring the three-dimensional position of particles in a fluid medium contained in a sample, wherein a temporal sequence of digitized holographic images is recorded, and then a reference hologram representing the reference beam is subtracted from each of the images in the sequence, so that the influence of the background introduced by the reference beam is reduced (lines 53-62, col. 7). Adrian (US 5,548,419) discloses a system for measuring the velocity of particles in a liquid medium by using holographic recording of the medium at two different perspectives and at two different points in time (see Abstract).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Leo Boutsikaris whose telephone number is 571-272-2308.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Leo Boutsikaris, Ph.D.
Patent Examiner, 2872
August 8, 2004